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Don Pedro Reservoir
Tuolumne County, California

(U.S.) National Eutrophication Survey, Corvallis, OR

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

DON PEDRO RESERVOIR

TUOLUMNE COUNTY

CALIFORNIA

EPA REGION IX

WORKING PAPER No. 744

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...P.O. 699-440

REPORT

ON

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WORKING PAPER No. 744

WITH THE COOPERATION OF THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

AND THE

CALIFORNIA NATIONAL GUARD

JUNE, 1978

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentration (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the California State Water Resources Control Board and the nine Regional Water Quality Control Boards for professional involvement, to the California National Guard for conducting the tributary sampling phase of the Survey, and to those California wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

The staff of the Division of Planning and Research of the State Water Resources Control Board provided invaluable lake documentation and counsel during the Survey, coordinated the reviews of the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

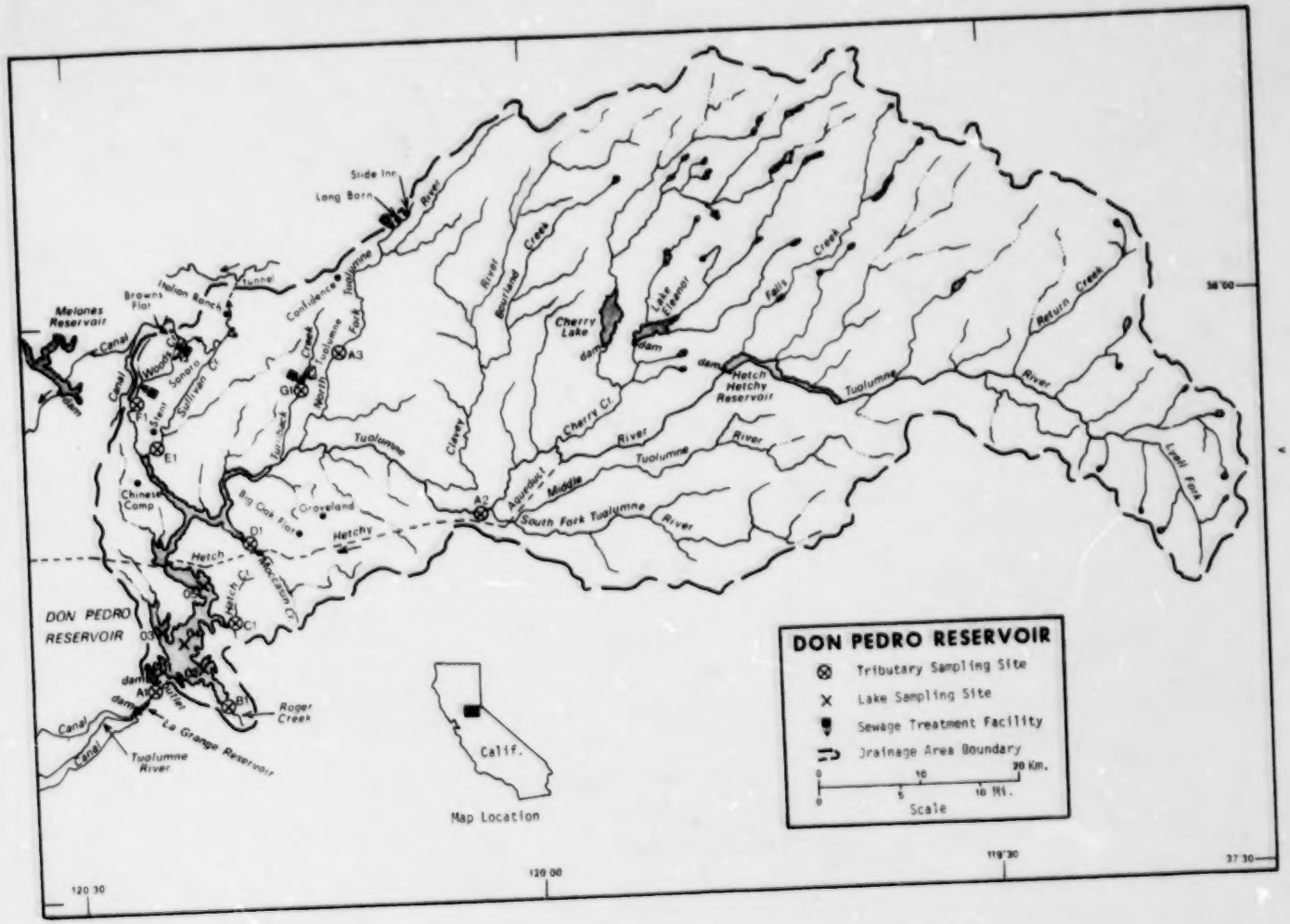
Major General Glen C. Ames, the Adjutant General of California, and Project Officer Second Lieutenant Terry L. Barrie, who directed the volunteer efforts of the California National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of California

Name	County
Amador	Amador
Boca	Nevada
Britton	Shasta
Casitas	Ventura
Crowley	Mono
Don Pedro	Tuolumne
Elsinore	Riverside
Fallen Leaf	El Dorado
Hennessey	Napa
Henshaw	San Diego
Iron Gate	Siskiyou
Lopez	San Luis Obispo
Mary	Mono
Mendocino	Mendocino
Nicasio	Marin
Lower Otay	San Diego
Pillsbury	Lake
Santa Margarita	San Luis Obispo
Shasta	Shasta
Shaver	Fresno
Silver	Mono
Tahoe	El Dorado, Placer, CA; Carson City, Douglas, Washoe, NV
Tulloch	Calaveras, Tuolumne
Lower Twin	Mono
Upper Twin	Mono


DON PEDRO RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Scale
Map Location
Calif.
Don Pedro Reservoir
La Grange Reservoir
Hetch Hetchy Reservoir
Lake Eleanor
Cherry Lake
Melones Reservoir
Groveland
Hetchy
Chinese Camp
Browns Flat
Italian Bench
Long Barn
Side Inn
Tuolumne River
South Fork Tuolumne River
Middle Tuolumne River
North Fork Tuolumne River
Cherry Cr.
Clavey River
Bourland Creek
Falls Creek
Return Creek
Lyell Fork
Big Oak Flat
Woods Cr.
Sullivan Cr.
Jacksmith Cr.
Hetch Cr.
Roger Creek
Aqueduct
Canal
Tunnel
Confidence
120 30
120 00
119 30
37 30
38 00

DON PEDRO RESERVOIR

STORET NO. 0606

I. CONCLUSIONS

A. Trophic Condition*:

Survey data indicate that Don Pedro Reservoir is mesotrophic. It ranked eighth in overall trophic quality among the 24 California lakes and reservoirs sampled in 1975 when compared using a combination of six water quality parameters**. Four of the water bodies had less median total phosphorus, four had less and two had the same median dissolved orthophosphorus, nine had less and five had the same median inorganic nitrogen, nine had less mean chlorophyll a, and ten had greater mean Secchi disc transparency. Some depression of dissolved oxygen with depth occurred at stations 1, 2, and 3 in November.

Survey limnologists noted small amounts of macrophytes in the shallows in June. Others also have assessed Don Pedro Reservoir as mesotrophic with no apparent nuisance conditions (Johns, 1975).

B. Rate-Limiting Nutrient:

The algal assay results are not considered representative of conditions in the reservoir at the times the samples were collected.

The reservoir data indicate nitrogen limitation in March and phosphorus limitation in June and November.

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* Trophic assessment is based on levels of nutrients, dissolved oxygen, and chlorophyll a; phytoplankton kinds and numbers; and transparency (Allum et al., 1977).

** See Appendix A.

C. Nutrient Controllability:

1. Point sources--It is estimated that the four known wastewater treatment plants contributed a little over 19% of the total phosphorus load to the reservoir during the sampling year. The Sonora plant accounted for 11.3% of the total, and the other three plants collectively contributed 8.0%.

The estimated phosphorus loading of 1.05 $g/m^2/yr$ is a little more than that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 13). It appears that 85% phosphorus removal at the four wastewater treatment plants would reduce the overall loading to 0.88 $g/m^2/yr$ (a mesotrophic loading). However, the point-source proportion of the total phosphorus load may be less than is shown since several of the significant tributaries of the reservoir were not gaged, and background phosphorus loads for those streams had to be estimated (see below). Therefore, the limitation of this assessment of point-source phosphorus control should be recognized.

2. Non-point sources--It is estimated that non-point sources, including direct precipitation, accounted for almost 81% of the total phosphorus load during the sampling year. The actual non-point contribution may be greater than that, however, since the North Fork Tuolumne River and Sullivan, Turnback, and Woods creeks were not gaged; and the drainage areas and flows of these streams were included in the estimated drainage area and flow of the "minor tributaries and immediate drainage" ("ZZ" of

U.S.G.S.). The phosphorus load attributed to ZZ was estimated using the mean ZZ flow and the mean phosphorus concentration in Moccasin Creek (0.040 mg/l) which was assumed to be a typical non-point concentration.

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 52.45 kilometers^2.
2. Mean depth: 47.7 meters.
3. Maximum depth: 173.1 meters.
4. Volume: 2,503.985 x 10^6 m^3.
5. Mean hydraulic retention time: 1.7 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Tuolumne River	2,393.2	27.750
Roger Creek	10.7	0.028
Minor tributaries & immediate drainage -	1,501.6	19.090
Totals	3,905.5	46.868

2. Outlet -

Tuolumne River	3,957.9**	46.860

C. Precipitation***:

1. Year of sampling: 89.7 centimeters.
2. Mean annual: 81.1 centimeters.

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† Table of metric equivalents--Appendix B.
†† Dendy, 1974.
* For limits of accuracy, see Working Paper No. 175, "... Survey Methods, 1973-1976".
** Includes area of reservoir.
*** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Don Pedro Reservoir was sampled three times during the open-water season of 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one or more depths at five stations on the reservoir (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first and last visits, a single 18.9-liter depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 54.9 meters at stations 1, 2, and 3; 73.2 meters at station 4; and 32.0 meters at station 5.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR DON PEDRO RESERVOIR
STORET CODE 0606

PARAMETER	1ST SAMPLING (3/11/75) 5 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (6/25/75) 5 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/12/75) 5 SITES RANGE	MEAN	MEDIAN
TEMP (C)	5.8 - 9.6	8.2	8.4	9.1 - 22.8	14.9	12.8	13.1 - 17.3	15.7	16.4
DISS OXY (MG/L)	6.4 - 10.4	9.1	9.4	4.4 - 10.0	8.1	8.2	3.6 - 9.2	7.3	8.0
CNDCTVY (MCROMO)	36. - 47.	40.	38.	16. - 57.	40.	42.	43. - 59.	54.	55.
PH (STAND UNITS)	6.8 - 8.1	7.2	7.2	6.9 - 7.9	7.3	7.2	6.6 - 7.5	7.0	6.9
TOT ALK (MG/L)	11. - 23.	17.	17.	11. - 23.	19.	20.	10. - 33.	21.	22.
TOT P (MG/L)	0.008 - 0.027	0.015	0.014	0.009 - 0.022	0.015	0.015	0.007 - 0.015	0.011	0.011
ORTHO P (MG/L)	0.002 - 0.024	0.008	0.006	0.002 - 0.011	0.005	0.003	0.002 - 0.010	0.003	0.002
NO2+NO3 (MG/L)	0.020 - 0.160	0.068	0.050	0.020 - 0.130	0.044	0.020	0.020 - 0.120	0.043	0.040
AMMONIA (MG/L)	0.020 - 0.030	0.022	0.020	0.020 - 0.120	0.029	0.020	0.020 - 0.020	0.020	0.020
KJEL N (MG/L)	0.200 - 0.800	0.247	0.200	0.200 - 0.300	0.229	0.200	0.200 - 0.200	0.200	0.200
INORG N (MG/L)	0.040 - 0.180	0.090	0.070	0.040 - 0.150	0.074	0.055	0.040 - 0.140	0.063	0.060
TOTAL N (MG/L)	0.230 - 0.830	0.315	0.275	0.220 - 0.330	0.273	0.300	0.220 - 0.320	0.243	0.240
CHLRPYL A (UG/L)	2.5 - 3.6	3.1	3.2	2.1 - 2.8	2.4	2.3	3.3 - 9.7	5.1	4.4
SECCHI (METERS)	1.8 - 2.1	1.9	1.9	2.4 - 3.0	2.8	2.7	4.3 - 4.3	4.3	4.3

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/11/75	1. Chroomonas (?) sp.	1,543
	2. Melosira sp.	450
	3. Cryptomonas sp.	107
	Total	2,100
06/25/75	1. Melosira sp.	2,260
	2. Chroomonas (?) sp.	231
	3. Centric diatoms	138
	4. Ceratium sp.	92
	5. Asterionella sp.	92
	Other genera	231
	Total	3,044
11/12/75	1. Chroomonas (?) sp.	171
	2. Melosira sp.	114
	3. Cryptomonas sp.	38
	4. Fragilaria sp.	19
	5. Peridinium sp.	19
	Total	361

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/11/75	1	3.6
	2	3.4
	3	2.5
	4	3.0
	5	-
06/25/75	1	2.2
	2	2.3
	3	2.1
	4	2.4
	5	2.8
11/12/75	1	3.4
	2	4.8
	3	4.4
	4	3.3
	5	9.7

C. Limiting Nutrient Study:

Due to significant nutrient changes in the samples during shipment from the field to the laboratory, the algal assay results are not considered representative of conditions in the reservoir at the times of sampling (03/11/75 and 11/12/75).

The reservoir data indicate nitrogen limitation in March and phosphorus limitation in June and November (the mean inorganic nitrogen/orthophosphorus ratios were 11/1, 15/1, and 21/1, respectively).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the California National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of April and May when two samples were collected. Sampling was begun in November, 1974, and was completed in August, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the California District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the mean concentrations in Moccasin Creek at station D-1 and the mean annual ZZ flow.

The operators of the Tuolumne Co. W.D. #1, Jamestown, Sonora, and Tuolumne wastewater treatment plants provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Tuolumne Co. W.D. #1	2,250	tr. filter	636.3	Trib. / N. Fk. Tuolumne River
Jamestown	2,500	tr. filter	686.3	Woods Creek
Sonora	3,100	tr. filter	2,023.1	Woods Creek
Tuolumne	1,300	tr. filter	547.2	Turnback Creek

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Tuolumne River	19,255	35.1
Roger Creek	50	0.1
b. Minor tributaries & immediate drainage (non-point load) -	24,080	43.8
c. Known municipal STP's -		
Tuolumne Co. W.D. #1	1,070	1.9
Jamestown	1,705	3.1
Sonora	6,230	11.3
Tuolumne	1,620	3.0
d. Septic tanks** -	5	< 0.1
e. Known industrial - None	-	-
f. Direct precipitation*** -	920	1.7
Total	54,935	100.0

2. Outputs -

Reservoir outlet - Tuolumne River 26,600

3. Net annual P accumulation - 28,335 kg.

* Treatment plant questionnaires.
** Estimate based on 15 shoreline dwellings and one park (Fenner, 1976); see Working Paper No. 175.
*** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Tuolumne River	678,220	50.8
Roger Creek	1,610	0.1
b. Minor tributaries & immediate drainage (non-point load) -	576,135	43.1
c. Known municipal STP's -		
Tuolumne Co. W.D. #1	2,450	0.2
Jamestown	4,195	0.3
Sonora	14,165	1.1
Tuolumne	2,755	0.2
d. Septic tanks* -	195	< 0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	56,625	4.2
Total	1,336,350	100.0

2. Outputs -

Reservoir outlet - Tuolumne River 1,328,520

3. Net annual N accumulation - 7,830 kg.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Tuolumne River	8	283
Roger Creek	5	150

* Estimate based on 15 shoreline dwellings and one park (Fenner, 1976); see Working Paper No. 175.
** See Working Paper No. 175.

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
N. Fk., Tuolumne River	0.027	0.910
Hatch Creek	0.026	1.601
Moccasin Creek	0.040	0.957
Sullivan Creek	0.061	1.189
Woods Creek*	0.704	2.797
Turnback Creek*	0.441	1.798

* The sampling stations on these creeks were close to upstream point sources (see map, page v).

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	1.05	0.54	25.5	0.1

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Don Pedro Reservoir:

"Dangerous" (eutrophic loading)	1.00
"Permissible" (oligotrophic loading)	0.50

V. LITERATURE REVIEWED

Allum, M.O., R.E. Glessner, and J.H. Gakstatter, 1977. An evaluation of the National Eutrophication Survey data. Working Paper No. 900, Corvallis, Env. Res. Lab., Corvallis, OR.

Dendy, William B., 1974. Personal communication (waterbody information and morphometry). CA Water Res. Contr. Bd., Sacramento.

Fenner, Ted, 1976. Personal communication (shoreline septic tanks). CA Water Res. Contr. Bd., Sacramento.

Johns, Gerald E., 1975. Personal communication (water quality data). CA Water Res. Contr. Bd., Sacramento.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
0601	AVADOR RESERVOIR	0.040	0.390	408.667	22.383	14.600	0.020
0602	BOCA LAKE	0.012	0.040	372.833	1.700	6.800	0.003
0603	LAKE BRITTON	0.067	0.115	446.500	4.811	11.200	0.047
0604	CASITAS RESERVOIR	0.029	0.050	400.250	3.192	14.000	0.014
0605	CROWLEY LAKE	0.046	0.045	374.750	5.800	12.200	0.034
0606	DON PEDRO RESERVOIR	0.013	0.060	381.733	3.564	11.400	0.004
0607	LAKE ELSINORE	0.469	0.120	489.214	70.572	8.000	0.092
0608	FALLEN LEAF RESERVOIR	0.007	0.040	24.357	0.786	8.800	0.005
0609	LAKE HENNESSEY	0.027	0.060	416.000	4.525	15.000	0.012
0610	LAKE HENSHAW	0.138	0.070	461.000	26.783	9.800	0.073
0611	IRON GATE RESERVOIR	0.184	0.690	440.333	6.217	13.800	0.124
0614	LOPEZ LAKE	0.371	0.090	372.000	8.658	15.000	0.343
0615	LAKE MARY	0.010	0.040	296.000	2.550	10.600	0.002
0616	LAKE MENDOCINO	0.020	0.050	436.500	3.100	9.400	0.008
0617	NICASIO RESERVOIR	0.055	0.345	482.778	6.633	9.800	0.013
0618	LOWER OTAY RESERVOIR	0.058	0.180	447.250	15.933	15.000	0.013
0619	LAKE PILLSBURY	0.022	0.060	466.667	6.389	8.200	0.008
0620	SANTA MARGARITA LAKE	0.037	0.070	400.000	9.122	14.800	0.014
0621	SHASTA LAKE	0.021	0.060	381.542	4.087	9.000	0.015
0622	SHAVER	0.014	0.060	346.400	1.700	7.400	0.004
0623	SILVER LAKE	0.012	0.055	356.000	1.800	7.000	0.003
0624	TULLOCK RESERVOIR	0.025	0.060	433.000	13.878	7.400	0.009
0625	UPPER TWIN LAKES	0.015	0.040	300.200	3.340	7.400	0.004
0626	LOWER TWIN LAKES	0.014	0.040	248.000	2.900	11.400	0.003

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
0601	AMADOR RESERVOIR	35 (8)	4 (1)	43 (10)	9 (2)	17 (4)	26 (6)	134
0602	BOCA LAKE	89 (20)	98 (22)	70 (16)	91 (21)	100 (23)	91 (20)	539
0603	LAKE BRITTON	17 (4)	22 (5)	17 (4)	48 (11)	43 (10)	17 (4)	164
0604	CASITAS RESERVOIR	43 (10)	74 (17)	48 (11)	70 (16)	22 (5)	37 (8)	294
0605	CROWLEY LAKE	30 (7)	78 (18)	65 (15)	43 (10)	30 (7)	22 (5)	268
0606	DON PEDRO RESERVOIR	83 (19)	54 (11)	57 (13)	61 (14)	37 (8)	78 (17)	370
0607	LAKE ELSINORE	0 (0)	17 (4)	0 (0)	0 (0)	78 (18)	9 (2)	104
0608	FALLEN LEAF RESERVOIR	100 (23)	87 (19)	100 (23)	100 (23)	70 (16)	70 (16)	527
0609	LAKE HENNESSEY	48 (11)	54 (11)	39 (9)	52 (12)	4 (0)	52 (12)	249
0610	LAKE HENSHAW	13 (3)	33 (7)	13 (3)	4 (1)	54 (12)	13 (3)	130
0611	IRON GATE RESERVOIR	9 (2)	0 (0)	26 (6)	39 (9)	26 (6)	4 (1)	104
0614	LOPEZ LAKE	4 (1)	26 (6)	74 (17)	26 (6)	4 (0)	0 (0)	134
0615	LAKE MARY	96 (22)	87 (19)	91 (21)	83 (19)	48 (11)	100 (23)	505
0616	LAKE MENDOCINO	65 (15)	70 (16)	30 (7)	74 (17)	61 (14)	63 (14)	363
0617	NICASIO RESERVOIR	26 (6)	9 (2)	4 (1)	30 (7)	54 (12)	46 (10)	169
0618	LOWER OTAY RESERVOIR	22 (5)	13 (3)	22 (5)	13 (3)	4 (0)	46 (10)	120
0619	LAKE PILLSBURY	57 (13)	41 (9)	9 (2)	35 (8)	74 (17)	63 (14)	279
0620	SANTA MARGARITA LAKE	39 (9)	33 (7)	52 (12)	22 (5)	13 (3)	37 (8)	196
0621	SHASTA LAKE	61 (14)	54 (11)	61 (14)	57 (13)	65 (15)	30 (7)	328
0622	SHAVER	78 (18)	41 (9)	83 (19)	96 (22)	87 (19)	78 (17)	463
0623	SILVER LAKE	89 (20)	65 (15)	78 (18)	87 (20)	96 (22)	91 (20)	506
0624	TULLOCK RESERVOIR	52 (12)	54 (11)	35 (8)	17 (4)	87 (19)	57 (13)	302
0625	UPPER TWIN LAKES	70 (16)	98 (22)	87 (20)	65 (15)	87 (19)	78 (17)	485
0626	LOWER TWIN LAKES	74 (17)	87 (19)	96 (22)	78 (18)	37 (8)	91 (20)	463

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	0602	BOCA LAKE	539
2	0608	FALLEN LEAF RESERVOIR	527
3	0623	SILVER LAKE	506
4	0615	LAKE MARY	505
5	0625	UPPER TWIN LAKES	485
6	0626	LOWER TWIN LAKES	463
7	0622	SHAVER	463
8	0606	DON PEDRO RESERVOIR	370
9	0616	LAKE MENDOCINO	363
10	0621	SHASTA LAKE	328
11	0624	TULLOCK RESERVOIR	302
12	0604	CASITAS RESERVOIR	294
13	0619	LAKE PILLSBURY	279
14	0605	CROWLEY LAKE	268
15	0609	LAKE HENNESSEY	249
16	0620	SANTA MARGARITA LAKE	196
17	0617	NICASIO RESERVOIR	169
18	0603	LAKE BRITTON	164
19	0614	LOPEZ LAKE	134
20	0601	AMADOR RESERVOIR	134
21	0610	LAKE HENSHAW	130
22	0618	LOWER OTAY RESERVOIR	120
23	0607	LAKE ELSINORE	104
24	0611	IRON GATE RESERVOIR	104

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 - cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR CALIFORNIA 11/30/76

LAKE CODE 0606 DON PEDRO RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 3957.9

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0606A1	3957.9	31.15	26.39	40.21	53.80	64.00	71.36	75.04	70.23	53.24	30.02	17.70	27.55	46.86
0606A2	2393.2	26.68	19.91	24.89	29.86	58.13	78.64	29.66	13.80	12.42	11.87	12.62	14.49	27.75
0606B1	10.7	0.144	0.122	0.058	0.014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.007	0.028
0606ZZ	2393.2	16.88	34.73	46.27	34.97	62.47	17.03	3.01	1.66	0.53	4.24	2.36	5.88	19.09

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 3957.9
SUM OF SUB-DRAINAGE AREAS = 4797.0

TOTAL FLOW IN = 563.17
TOTAL FLOW OUT = 560.67

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0606A1	11	74	55.218	16	50.404				
	12	74	63.430	7	59.182				
	1	75	68.819	11	58.050				
	2	75	41.626	5	50.970				
	3	75	486139	13	58.899				
	4	75	57.200	19	45.307	5	50.970		
	5	75	75.889	7	75.323	27	91.463		
	6	75	80.137						
	7	75	87.216	21	88.915				
	8	75	69.093	24	35.679				
	9	75	66.828						
	10	75	61.731						
0606A2	11	74	23.814	16	27.014				
	12	74	19.595	7	22.540				
	1	75	21.124						
	2	75	31.998						
	3	75	37.945	13	35.113				
	4	75	38.228	19	36.246	5	35.679		
	5	75	57.766	7	45.024	27	65.695		
	6	75	148.663						
	7	75	36.529	21	30.582				
	8	75	19.255	24	8.042				
	9	75	19.935						
	10	75	18.944						

TRIBUTARY FLOW INFORMATION FOR CALIFORNIA 11/30/76

LAKE CODE 0606 DON PEDRO RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
060691	11	74	0.0	16	0.0				
	12	74	0.003						
	1	75	0.003	11	0.003				
	2	75	0.102	5	0.133				
	3	75	0.062	13	0.566				
	4	75	0.008	19	0.096	5	0.011		
	5	75	0.0	7	0.0	27	0.003		
	6	75	0.0						
	7	75	0.0	21	0.0				
	8	75	0.0	24	0.0				
	9	75	0.0						
	10	75	0.0						
060622	11	74	3.681						
	12	74	6.575						
	1	75	11.015						
	2	75	46.446						
	3	75	58.050						
	4	75	37.095						
	5	75	1.253						
	6	75	20.674						
	7	75	3.058						
	8	75	1.926						
	9	75	0.728						
	10	75	5.607						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/09/24

060601
37 42 46.0 120 24 03.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA
141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/11	11 20	0000	9.6	10.4	84	41	8.10	23	0.030	0.600	0.020	0.005
	11 20	0005	9.5	10.2		38	8.00	16	0.020	0.500	0.020	0.015
	11 20	0027	9.2	9.8		37	7.80	19	0.020	0.200K	0.030	0.007
	11 20	0038	8.2	9.4		37	7.40	15	0.020	0.200K	0.040	0.009
	11 20	0080	7.9	9.2		38	7.40	13	0.020K	0.200K	0.050	0.006
	11 20	0134	7.8	8.0		40	7.20	14	0.020K	0.200K	0.100	0.009
	11 20	0155	7.4	7.2		43	7.20	16	0.020K	0.200K	0.130	0.010
	11 20	0180	7.1	6.6		44	7.20	16	0.020K	0.200K	0.150	0.013
75/06/25	09 25	0000	21.2	8.2	120	50	7.20	20	0.020K	0.300	0.020K	0.009
	09 25	0005	20.9	4.4		44	7.40	20	0.020K	0.300	0.020K	0.010
	09 25	0020	20.4	7.8		42	7.40	19	0.020K	0.300	0.020K	0.002
	09 25	0030	13.4	6.8		34	7.20	17	0.020K	0.200	0.020K	0.011
	09 25	0060	11.4	7.6		32	7.10	15	0.020K	0.200K	0.020K	0.002
	09 25	0090	10.2	7.6		37	7.00	19	0.020K	0.200K	0.110	0.005
	09 25	0120	9.6	7.4		38	7.00	19	0.020K	0.200K	0.120	0.005
	09 25	0170	9.1	8.2		38	7.00	18	0.020K	0.200K	0.120	0.006
75/11/12	13 15	0000	17.0	8.6	168	59	7.20	33	0.020K	0.200K	0.050	0.003
	13 15	0005	16.8	8.6		57	7.20	33	0.020K	0.200K	0.050	0.002
	13 15	0015	16.6	8.6		53	7.20	30	0.020K	0.200K	0.040	0.002
	13 15	0035	16.6	8.6		57	7.20	24	0.020K	0.200K	0.040	0.002
	13 15	0070	15.3	4.6		49	6.90	19	0.020K	0.200K	0.050	0.003
	13 15	0110	14.4	5.8		51	6.80	20	0.020K	0.200K	0.040	0.004
	13 15	0145	13.9	6.0		53	6.80	20	0.020K	0.200K	0.060	0.006
	13 15	0175	13.7	6.2		55	6.80	22	0.020K	0.200K	0.080	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060601
37 42 46.0 120 24 03.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA
141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/11	11 20	0000	0.020	3.6	
	11 20	0005	0.017		
	11 20	0027	0.027		
	11 20	0038	0.014		
	11 20	0080	0.012		
	11 20	0134	0.013		
	11 20	0155	0.015		
	11 20	0180	0.017		
75/06/25	09 25	0000	0.018	2.2	
	09 25	0005	0.020		
	09 25	0020	0.022		
	09 25	0030	0.019		
	09 25	0060	0.011		
	09 25	0090	0.013		
	09 25	0120	0.012		
	09 25	0170	0.013		
75/11/12	13 15	0000	0.013	3.4	
	13 15	0005	0.015		
	13 15	0015	0.013		
	13 15	0035	0.013		
	13 15	0070	0.012		
	13 15	0110	0.009		
	13 15	0145	0.014		
	13 15	0175	0.010		

STORET RETRIEVAL DATE 76/09/24

060602
37 42 25.0 120 22 24.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA

141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/11	12 50	0000	9.2	10.0	72	41	7.35	13	0.020	0.200K	0.050	0.012
	12 50	0005	9.0	10.0		46	7.30	11	0.020	0.200K	0.040	0.008
	12 50	0032	9.1	9.8		37	7.30	11	0.020K	0.200K	0.040	0.004
	12 50	0047	8.7	9.4		36	7.20	12	0.020K	0.200K	0.050	0.007
	12 50	0065	8.4	9.4		36	7.10	13	0.030	0.200	0.070	0.009
	12 50	0105	8.1	9.4		37	7.15	13	0.020K	0.200K	0.080	0.008
	12 50	0137	7.9	8.4		39	7.00	14	0.020K	0.200K	0.100	0.006
	12 50	0180	6.7	7.8		47	7.10	18	0.020K	0.200K	0.140	0.012
75/06/25	11 55	0000	22.8	8.2	96	50	7.40	23	0.120	0.300	0.020K	0.002K
	11 55	0005	22.3	8.0		39	7.60	22	0.050	0.300	0.020K	0.003
	11 55	0015	22.1	8.2		40	7.60	22	0.050	0.300	0.020K	0.011
	11 55	0025	13.4	7.6		32	7.30	18	0.040	0.200	0.020K	0.011
	11 55	0050	11.6	8.4		27	7.20	17	0.030	0.200	0.020K	0.011
	11 55	0080	10.7	7.2		38	7.00	21	0.030	0.200	0.020K	0.010
	11 55	0120	9.6	8.4		43	7.00	22	0.040	0.200K	0.100	0.007
	11 55	0170	9.1	8.2		43	7.00	23	0.030	0.200K	0.100	0.008
75/11/12	15 20	0000	17.3	8.4	168	57	7.00	22	0.020K	0.200K	0.040	0.002K
	15 20	0005	17.0	8.8		57	7.05	21	0.020K	0.200K	0.020K	0.002K
	15 20	0015	16.9	8.4		57	7.05	24	0.020K	0.200K	0.020K	0.002
	15 20	0030	16.8	8.4		57	7.10	24	0.020K	0.200K	0.020K	0.002K
	15 20	0065	15.6	5.0		49	6.90	23	0.020K	0.200K	0.020K	0.002K
	15 20	0100	14.6	5.4		51	6.80	24	0.020K	0.200K	0.030	0.004
	15 20	0135	14.0	6.2		53	6.80	29	0.020K	0.200K	0.050	0.004
	15 20	0175	13.1	6.4		57	6.80	32	0.020K	0.200K	0.080	0.004

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060602
37 42 25.0 120 22 24.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA
141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/11	12 50	0000	0.016	3.4	
	12 50	0005	0.014		
	12 50	0032	0.013		
	12 50	0047	0.012		
	12 50	0065	0.009		
	12 50	0105	0.009		
	12 50	0137	0.011		
	12 50	0180	0.019		
75/06/25	11 55	0000	0.020	2.3	
	11 55	0005	0.021		
	11 55	0015	0.018		
	11 55	0025	0.016		
	11 55	0050	0.012		
	11 55	0080	0.011		
	11 55	0120	0.012		
	11 55	0170	0.013		
75/11/12	15 20	0000	0.011	4.8	
	15 20	0005	0.010		
	15 20	0015	0.012		
	15 20	0030	0.010		
	15 20	0065	0.008		
	15 20	0100	0.012		
	15 20	0135	0.011		
	15 20	0175	0.010		

STORET RETRIEVAL DATE 76/09/24

060603
37 43 37.0 120 24 13.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA

141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/11	13 40	0000	9.4	10.0	76	39	7.30	17	0.020	0.300	0.050	0.004
	13 40	0005	9.4	9.8		36	7.15	20	0.020K	0.300	0.040	0.004
	13 40	0010	9.1									
	13 40	0020	8.9	9.6		37	7.10	18	0.020K	0.200	0.040	0.006
	13 40	0050	8.5	9.2		39	7.00	17	0.020K	0.200K	0.060	0.003
	13 40	0090	8.2	8.8		38	7.00	16	0.020K	0.200	0.070	0.003
	13 40	0130	7.3	7.8		44	6.90	15	0.020K	0.200K	0.100	0.006
	13 40	0180	6.9	6.4		44	6.75	15	0.020K	0.200K	0.160	0.010
75/06/25	10 05	0000	21.4	8.0	120	49	7.40	20	0.020K	0.200	0.030	0.002K
	10 05	0005	21.4	8.2		46	7.60	22	0.020K	0.300	0.020K	0.002K
	10 05	0015	20.5	8.0		47	7.40	22	0.020K	0.200	0.020K	0.002K
	10 05	0030	12.9	8.2		32	7.30	16	0.020K	0.200K	0.020K	0.002
	10 05	0060	11.5	8.6		32	7.15	16	0.020	0.200K	0.020	0.002
	10 05	0090	10.5	7.6		46	7.00	20	0.020K	0.200K	0.100	0.005
	10 05	0120	9.8	7.8		45	6.90	18	0.020K	0.200K	0.110	0.005
	10 05	0170	9.3	8.0		47	6.95	20	0.020K	0.200K	0.130	0.006
75/11/12	13 40	0000	17.0	8.6	168	57	6.90	22	0.020K	0.200K	0.040	0.002K
	13 40	0005	16.8	8.0		57	7.00	24	0.020K	0.200K	0.020K	0.003
	13 40	0015	16.6	9.2		57	6.90	24	0.020K	0.200K	0.020K	0.002
	13 40	0030	16.6	7.4		57	6.95	26	0.020K	0.200K	0.020K	0.002K
	13 40	0065	15.4	3.6		51	6.70	23	0.020K	0.200K	0.020K	0.005
	13 40	0095	14.7	4.2		53	6.60	27	0.020K	0.200K	0.040	0.007
	13 40	0135	14.0	5.2		55	6.60	26	0.020K	0.200K	0.060	0.007
	13 40	0175	13.6	5.0		57	6.80	12	0.020K	0.200K	0.060	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060603
37 43 37.0 120 24 13.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA

141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/11	13 40	0000	0.013	2.5	
	13 40	0005	0.014		
	13 40	0020	0.009		
	13 40	0050	0.008		
	13 40	0090	0.009		
	13 40	0130	0.011		
	13 40	0180	0.015		
75/06/25	10 05	0000	0.016	2.1	
	10 05	0005	0.017		
	10 05	0015	0.020		
	10 05	0030	0.013		
	10 05	0060	0.017		
	10 05	0090	0.013		
	10 05	0120	0.012		
	10 05	0170	0.014		
75/11/12	13 40	0000	0.010	4.4	
	13 40	0005	0.014		
	13 40	0015	0.014		
	13 40	0030	0.012		
	13 40	0065	0.012		
	13 40	0095	0.015		
	13 40	0135	0.012		
	13 40	0175	0.011		

STORET RETRIEVAL DATE 76/09/24

060604
37 43 52.0 120 22 56.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA

141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/13	09 55	0000	8.9	10.2	72	36	7.30	19	0.030	0.800	0.030	0.003
	09 55	0005	8.9	10.2		36	7.30	19	0.020	0.200	0.030	0.002
	09 55	0025	8.5	9.8		37	7.30	17	0.030	0.200K	0.040	0.005
	09 55	0050	8.1	9.4		37	7.25	18	0.030	0.200K	0.040	0.004
	09 55	0090	7.6	9.0		36	7.15	18	0.020	0.200K	0.060	0.002
	09 55	0130	6.9	9.2		41	7.10	20	0.020	0.200K	0.090	0.006
	09 55	0175	6.2	9.0		44	7.00	21	0.020	0.200K	0.110	0.020
	09 55	0240	5.8	9.2		44	7.10	22	0.030	0.200K	0.120	0.024
75/06/25	10 40	0000	21.7	8.2	108	57	7.70	19	0.020K	0.300	0.030	0.004
	10 40	0005	21.7	6.0		51	7.60	22	0.020K	0.300	0.020K	0.008
	10 40	0015	21.3	8.2		49	7.60	22	0.020K	0.300	0.020K	0.003
	10 40	0030	13.1	9.4		24	7.30	14	0.020K	0.200	0.020K	0.010
	10 40	0060	11.2	9.2		31	7.10	12	0.020	0.200K	0.030	0.007
	10 40	0090	10.3	8.2		45	7.10	19	0.020K	0.200K	0.080	0.003
	10 40	0120	9.7	8.0		46	7.00	20	0.020K	0.200K	0.100	0.002
	10 40	0170	9.1	8.8		53	7.70	22	0.020K	0.200	0.020	0.003
75/11/12	14 10	0000	17.2	8.4	168	55	6.90	10	0.020K	0.200K	0.020K	0.002K
	14 10	0005	17.1	8.6		57	6.90	14	0.020K	0.200K	0.020K	0.002
	14 10	0015	16.9	8.4		57	7.00	13	0.020K	0.200K	0.020K	0.002K
	14 10	0034	16.8	8.2		55	6.90	16	0.020K	0.200K	0.020K	0.002K
	14 10	0065	15.6	7.2		45	6.80	12	0.020K	0.200K	0.020K	0.002K
	14 10	0100	14.6	7.6		43	6.70	17	0.020K	0.200K	0.060	0.005
	14 10	0135	14.0	8.0		43	6.70	12	0.020K	0.200	0.070	0.002
	14 10	0175	13.2	7.6		53	6.65	16	0.020K	0.200K	0.120	0.003

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060604
37 43 52.0 120 22 56.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA
141091

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/13	09 55	0000	0.018	3.0	
	09 55	0005	0.015		
	09 55	0025	0.016		
	09 55	0050	0.011		
	09 55	0090	0.011		
	09 55	0130	0.018		
	09 55	0175	0.021		
	09 55	0240	0.026		
75/06/25	10 40	0000	0.016	2.4	
	10 40	0005	0.015		
	10 40	0015	0.015		
	10 40	0030	0.013		
	10 40	0060	0.015		
	10 40	0090	0.010		
	10 40	0120	0.009		
	10 40	0170	0.018		
75/11/12	14 10	0000	0.009	3.3	
	14 10	0005	0.010		
	14 10	0015	0.010		
	14 10	0034	0.009		
	14 10	0065	0.007		
	14 10	0100	0.011		
	14 10	0135	0.009		
	14 10	0175	0.010		

STORET RETRIEVAL DATE 76/09/24

060605
37 46 36.0 120 21 45.0 3
DON PEDRO RESERVOIR
06109 CALIFORNIA

141091

11EPALES 2111202
0200 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/13	11 00	0000	9.1		78	38	7.50	22	0.030	0.200	0.030	0.013
75/06/25	11 20	0000	22.0	7.8	108	53	7.95	23	0.050	0.300	0.020	0.002
	11 20	0005	21.5	8.6		44	7.85	23	0.060	0.200	0.020K	0.002K
	11 20	0018	15.8	9.4		23	7.50	15	0.040	0.200	0.020K	0.002K
	11 20	0030	12.8	9.8		16	7.30	11	0.050	0.200K	0.020K	0.002
	11 20	0070	10.9	10.0		16	7.15	11	0.020	0.200K	0.020	0.002
	11 20	0101	10.1	9.0		31	7.10	18	0.030	0.200K	0.050	0.003
75/11/13	14 45	0000	17.3	8.6	168	57	7.50	15	0.020K	0.200K	0.040	0.002K
	14 45	0005	17.1	8.8		57	7.45	12	0.020K	0.200K	0.020K	0.002K
	14 45	0015	16.9	8.6		55	7.40	24	0.020K	0.200K	0.080	0.010
	14 45	0034	16.3	8.6		55	7.40	21	0.020K	0.200K	0.040	0.002K
	14 45	0070	15.2	8.0		47	7.10	18	0.020K	0.200K	0.060	0.002K
	14 45	0105	14.5	7.2		45	7.15	20	0.020K	0.200K	0.090	0.003

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/13	11 00	0000	0.014		
75/06/25	11 20	0000	0.017	2.8	
	11 20	0005	0.017		
	11 20	0018	0.019		
	11 20	0030	0.012		
	11 20	0070	0.012		
	11 20	0101	0.011		
75/11/13	14 45	0000	0.010	9.7	
	14 45	0005	0.012		
	14 45	0015	0.013		
	14 45	0034	0.011		
	14 45	0070	0.009		
	14 45	0105	0.010		

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/09/24

0606A1
37 42 06.0 120 25 16.0 4
TUOLUMNE RIVER
06 15 MERCED FALLS
O/DON PEDRO RESERVOIR 141091
BANK BELOW NEW DON PEDRO DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	16 00		0.080	0.600	0.030	0.010	0.010
74/12/07	15 30		0.104	0.450	0.010	0.005	0.040
75/01/11	10 20		0.064	0.900	0.040	0.005	0.010K
75/02/05	09 45		0.071	1.200	0.032	0.005	0.010
75/03/13	10 45		0.128	0.500	0.008K	0.008	0.010
75/04/05	09 30		0.110	1.350	0.030	0.010	0.010
75/04/19	10 05		0.110	0.250	0.005	0.010	0.030
75/05/07	10 00		0.110	1.100	0.015	0.010	0.010
75/05/27	09 50		0.105	1.000	0.015		0.020
75/07/21	09 50		0.110	1.350	0.032	0.010	0.010
75/08/24	10 00		0.100	0.100	0.010	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

0606A2
37 50 15.0 120 03 05.0 4
TUOLUMNE RIVER
06 15 TUOLUMNE
T/DON PEDRO RESERVOIR 141091
BNK LMSDN BRDG CMPGRND 10 MI E GRVLND
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	13	10	0.008	0.700	0.030	0.005K	0.010K
74/12/07	13	00	0.024	1.500	0.010	0.005K	
75/03/13	12	00	0.024	0.400	0.008K	0.008K	0.010K
75/04/19	13	00	0.005	0.750	0.015	0.015	0.015
75/05/07	13	15	0.030	0.725	0.015	0.005K	0.010K
75/05/27	13	10	0.020	0.200	0.025	2.800	0.040
75/07/21	12	05	0.010	1.450	0.035	0.010	0.030
75/08/24	13	20	0.005	0.350	0.015	0.005K	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

0606A3
37 59 10.0 120 12 15.0 4
NORTH FORK TUOLUMNE RIVER
06 15 TUOLUMNE
T/DON PEDRO RESERVOIR 141091
SEC RD BRDG 2 MI NE TUOLUMNE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	10	50	0.016	1.400	0.035	0.005	0.010K
74/12/07	11	10	0.056	1.400	0.025		
75/01/11	15	30	0.048	1.300	0.015	0.005	0.030
75/02/05	12	45	0.048	1.300	0.016	0.019	0.020
75/03/13	15	45	0.048	0.400	0.008K	0.008K	0.020
75/04/05	15	45	0.045	1.650	0.025	0.005	0.010
75/04/19	15	45	0.015	0.450	0.015	0.010	0.028
75/05/07	15	30	0.040	0.850	0.010	0.005	0.010
75/05/27	14	40	0.030	0.350	0.010	0.010	0.050
75/07/21	14	25	0.020	0.325	0.025	0.020	0.040
75/08/24	14	45	0.015	0.200	0.050	0.010	0.055

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060681
37 40 30.0 120 20 30.0 4
ROGER CREEK
06 15 MERCED FALLS
T/DON PEDRO RESERVOIR 141091
RT 132 BRDG 10.5 MI ENE OF LA GRANGE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/01/11	12 00		1.320	1.200	0.020	0.035	0.050
75/02/05	10 00		1.160	1.400	0.016	0.055	0.090
75/03/13	11 00		0.224	1.100	0.008K	0.032	0.040
75/04/05	09 45		0.040	2.000	0.050	0.015	0.060
75/04/19	10 30		0.065	0.600	0.020	0.030	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

0606C1
37 44 55.0 120 19 50.0 4
HATCH CREEK
06 15 MERCED FALLS
T/DON PEDRO RESERVOIR 141091
BNK 100 FT FRM MRSH FLT ND 17 M NE LA GR
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/12/07	14	45	0.528	0.300	0.015	0.005K	0.050
75/01/11	12	20	0.368	0.700	0.020	0.005	0.010K
75/02/05	10	25	0.200	1.100	0.008K	0.010	0.020
75/03/13	11	30	0.192	0.600	0.008K	0.008	0.010K
75/04/05	10	15	0.095	6.250	0.065	0.005K	0.010K
75/04/19	11	00	0.100	0.450	0.015	0.00P	0.010
75/05/07	10	40	0.025	2.400	0.035	0.010	0.010
75/05/27	10	00	0.150	0.600	0.015	0.010	0.030
75/07/21	10	00	0.105	0.250K	0.020	0.005K	0.080

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060601
37 49 00.0 120 18 45.0 4
MOCCASIN CREEK
06 15 SONORA
T/DON PEDRO RESERVOIR 141091
BNK .8 MI NW OF MOCCASIN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	14 05		0.024	1.100	0.360	0.030	0.080
74/12/07	14 25		0.024	0.400	0.030	0.005K	0.030
75/01/11	12 45		0.024	1.000	0.035	0.005	0.010K
75/02/05	10 45		0.056	0.700	0.016	0.005	0.015
75/03/13	12 00		0.024	1.000	0.008	0.008	0.140
75/04/05	10 40		0.025	2.400	0.055	0.005	0.020
75/04/19	11 30		0.020	0.650	0.017	0.005	0.020
75/05/07	11 15		0.190	0.300	0.020	0.005K	0.010K
75/05/27	10 20		0.070	0.600	0.010	0.015	0.030
75/07/21	10 35		0.090	1.300	0.030	0.010	0.020
75/08/24	10 30		0.035	0.500	0.070	0.030	0.070

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

0606E1
37 54 10.0 120 24 30.0 4
SULLIVAN CREEK
06 15 SONORA
T/DON PEDRO RESERVOIR 141091
FAS 1421 BRDG 3.5 MI S OF JAMESTOWN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	09 30		0.016	0.600	0.035	0.015	0.080
74/12/07	10 10		0.304		0.030	0.030	
75/01/11	17 00		0.352	1.000	0.030	0.030	0.080
75/02/05	14 25		0.416	1.300	0.040	0.050	0.100
75/03/13	14 00		0.256	0.800	0.008K	0.032	0.040
75/04/05	13 30		0.190	1.575	0.040	0.050	0.200
75/04/19	14 45		0.030	2.200	0.030	0.010	0.030
75/05/07	16 45		0.075	1.000	0.020	0.010	0.010
75/05/27	10 05		0.065	0.400	0.020	0.020	0.030
75/07/21	15 25		0.045	1.300	0.045	0.010	0.020
75/08/24	16 15		0.020	0.250	0.020	0.015	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

0606F1
37 56 20.0 120 25 50.0 4
WOODS CREEK
06 15 SONORA
T/DON PEDRO RESERVOIR 141091
LGHT DTY RD BRDG 1 MI SW OF JAMESTOWN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	09 07		0.120	1.300	0.045	0.675	0.890
74/12/07	09 55		1.600	1.500	0.370	0.680	0.760
75/01/11	16 30		1.760	1.500	0.375	0.620	0.735
75/02/05	14 00		1.010	1.700	0.264	0.290	0.380
75/03/13	14 30		0.768	0.800	0.088	0.240	0.325
75/04/05	14 00		0.095	1.700	0.035	0.035	0.070
75/04/19	14 30		0.640	1.500	0.120	0.390	0.440
75/05/07	16 30		0.830	1.200	0.180	0.550	0.620
75/05/27	15 45		2.200	1.400	0.500	1.230	1.300
75/07/21	15 05		0.790	1.450	0.075	0.700	0.720
75/08/24	15 48		1.650	5.250	0.330	1.350	1.500

STORET RETRIEVAL DATE 76/09/24

06066G1
37 57 00.0 120 14 45.0 4
TURNBACK CREEK
06109 15 TUOLUMNE
T/DON PEDRO RESERVOIR 141091
ABVE YSMTE ST BRDG .5 MI SW OF TUOLUMNE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	10 30		0.432	1.450	0.465	0.480	0.530
74/12/07	11 25		0.432	2.800	0.375	0.220	0.630
75/01/11	15 45		0.432	1.300	0.290	0.150	0.210
75/02/05	13 00		0.320	1.100	0.096	0.075	0.130
75/03/13	15 15		0.200	0.900	0.120	0.096	0.150
75/04/05	14 45		0.170	1.650	0.125	0.100	0.200
75/04/19	15 15		0.085	0.650	0.070	0.080	0.100
75/05/07	15 00		0.150	1.350	0.180	0.145	0.160
75/05/27	14 10		0.360	0.975	0.270	0.390	0.400
75/08/24	14 20		1.720	1.500	0.300	1.650	1.900

STORET RETRIEVAL DATE 76/09/24

0606EA AS0606EA P002250
38 02 00.0 120 14 00.0 4
TUOLUMNE CO WD #1
0610Y 1S LONG BARN
T/DON PEDRO 141091
SULLIVAN CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/01/24	09	00	2.080	13.000	4.400	4.100	5.300	0.130	0.115
75/02/24	10	00	2.000	9.100	4.300	2.600	3.100	0.130	0.300
75/03/25	11	30	0.955	2.800	1.760	1.280	1.500	0.130	0.130
75/04/30	09	30	1.500	3.800	1.450	2.000	2.200	0.130	0.130
75/05/30	10	00	2.500	4.700	2.100	3.000	3.100	0.130	0.130
75/07/06	09	00	2.300	7.600	2.100	3.300	4.600	0.320	0.280
75/07/28	10	00	2.600	5.910	4.100	4.000	5.000	0.250	0.250
75/08/24	10	00	9.200	7.300	3.500	5.900	6.000	0.155	0.170
75/09/26	11	00	6.600	5.100	1.880	5.000	5.400	0.153	0.150
75/10/30	08	00	7.650	4.100	0.690	4.800	5.700	0.213	0.056
75/12/01	09	30	5.800	5.700	2.700	4.900	6.500	0.140	0.143
75/12/31	11	00	3.900	10.000	5.100	4.800	5.000	0.174	0.163

STORET RETRIEVAL DATE 76/09/24

0606FA TF0606FA P0025000
37 57 10.0 120 25 00.0 4
JAMESTOWN
06109 IS SONORA
T/DON PEDRO 141091
WOODS CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/28	11 00								
CP(T)-									
75/02/28	16 00		2.560	11.500	2.530	4.250	5.400	0.175	0.235
75/03/31	11 00								
CP(T)-									
75/03/31	16 00		3.200	8.700	0.610	2.600	3.900	0.236	0.224
75/04/30	11 00								
CP(T)-									
75/04/30	16 00		2.800	10.600	3.800	3.900	4.800	0.204	0.224
75/05/31	11 00								
CP(T)-									
75/05/31	16 00		5.300	16.500	7.300	8.300	9.200	0.161	0.172
75/06/30	11 00								
CP(T)-									
75/06/30	16 00		4.000	18.500	6.900	6.900	8.000	0.170	0.160
75/07/31	11 00								
CP(T)-									
75/07/31	16 00		2.800	12.000	2.800	4.300	8.700	0.170	0.160
75/09/01	11 00								
CP(T)-									
75/09/01	16 00		2.100	11.000	1.500	5.800	6.500	0.170	0.165
75/09/30	11 00								
CP(T)-									
75/09/30	16 00		1.880	10.500	1.800	5.100	5.800	0.159	0.152
75/10/31	11 00								
CP(T)-									
75/10/31	16 00		1.900	11.000	3.600	6.000	6.200	0.260	0.160
75/11/30	11 00								
CP(T)-									
75/11/30	16 10		0.175	20.000	8.800	7.200	7.600	0.209	0.200
75/12/31	11 00								
CP(T)-									
75/12/31	16 00		1.570	19.000	6.900	5.500	6.600	0.183	0.170
76/01/31	11 00								
CP(T)-			2.100	22.000	15.500	6.800	8.100	0.165	0.173

STORET RETRIEVAL DATE 76/09/24

0606FA TF0606FA P002500
37 57 10.0 120 25 00.0 4
JAMESTOWN
06109 15 SONORA
T/DON PEDRO 141091
WOODS CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
76/02/29	11 00		2.880	18.000	9.900	6.000	6.800	0.157	0.162

STORET RETRIEVAL DATE 76/09/24

0606FB TF0606FB P003100
37 59 00.0 120 23 15.0 4
SONORA
06 15 SONORA
T/DON PEDRO 141091
WOODS CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/03/18	10	30	0.240	18.000	6.650	6.800	7.100		0.360
75/04/29	10	40	0.050	21.000	7.400	6.700	7.300	0.330	0.400
75/06/23	14	30	0.075	25.000	6.900	8.700	10.500	0.400	0.400
75/07/30	15	00	1.050	5.600	0.075	8.800	9.600	0.500	0.400
75/08/29	12	30	0.025	14.500	8.500	7.500	8.100	1.500	1.500
75/11/06	10	30	0.275	18.000	7.000		7.800	0.400	0.450
75/12/03			1.500	17.000	5.900	5.100	6.700	0.400	0.400
76/01/30	11	00	0.100	36.000	14.500	7.500	10.000	0.500	0.500
76/03/02	11	00	0.075	26.000	10.200L	7.600	8.700	0.400	0.400

L ACTUAL VALUE IS KNOWN TO BE
GREATER THAN VALUE GIVEN

STORET RETRIEVAL DATE 76/09/24

0606GA TF0606GA P001300
37 57 10.0 120 14 45.0 4
TUOLUMNE
06109 15 TUOLUMNE
T/DON PEDRO 141091
TURNBACK CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/13	09	00	3.360	11.000	3.000	3.250	4.000	0.100	0.100
75/03/13	10	00	5.520	3.550	2.000	4.100	4.200	0.100	0.300
75/04/15	09	00	5.500	9.800	2.300	5.100	5.500	0.100	0.100
75/05/22	11	00	0.050	0.670	0.050K	0.064	0.100	0.101	0.100
75/06/23	09	00	3.850	13.500	6.600	10.500	12.000	0.101	0.100
75/07/23	08	00	2.600	5.100	2.100	7.900	8.200	0.100	0.101
75/08/21	10	00	3.800	16.000	8.500	9.750	18.000	0.100	0.300
75/09/16	09	00	4.400	18.000	8.200	11.500	12.500	0.100	0.100
75/10/17	08	00	5.600	12.000	5.500	7.100	8.400	0.100	0.100

K VALUE KNOWN TO BE
LESS THAN INDICATED